Annals of the Royal College of Surgeons of England (1990) *vol.* 72, 123–124

The significance of β-haemolytic streptococci in chronic leg ulcers

Ivor G Schraibman MCh FRCS FRCSEd
Consultant Surgeon
Birch Hill Hospital, Rochdale

Key words: Leg ulcers, streptococcus

β-Haemolytic streptococci were identified in 18.8% of bacterial isolates from 91 legs of patients with leg ulcers swabbed routinely. This previously unreported high incidence is ascribed to selective culture methods. In view of its sensitivity to simple antibiotics and its reputed proclivity for skin destruction, the β-haemolytic streptococcus should be sought and, if found, energetically treated.

It is accepted that a break in the continuity of an epithelial surface, unless occurring under sterile conditions, is liable to bacterial colonisation; this particularly applies to leg ulcers. Some clinicians routinely treat this lesion with antibiotics but others consider the bacterial growth as incidental. A representative view states that 'as a rule, the bacteria in ulcers are saprophytic and will disappear when the favourable environment for their growth is lost' *(1)*. The same authors state that they find no reason to routinely examine leg ulcers bacteriologically.

Initial policy in the leg ulcer clinic was to undertake bacteriological studies only on indication, ie obvious cellulitis or failure to improve. The early results yielded a high proportion of β-haemolytic streptococci which had not been reported elsewhere *(2)*. Swabs are taken routinely now and the results are presented here. The reason for the unusual distribution is elucidated and recommendations are made which are relevant to leg ulcers failing to respond to otherwise adequate treatment.

Material and methods

Routine bacteriological swabs were taken on 165 occasions from 91 leg ulcers. All new patients were thus examined and this was repeated to monitor the effect of antibiotic therapy or where the ulcer deteriorated.

Swabs were plated the same day or kept overnight at 4°C and plated the following day. Table I shows that six plates (three aerobic and three anaerobic) were used. The third aerobic plate contained colistin sulphate to exclude faecal type organisms and oxolinic acid to remove staphylococci, thus allowing pure growth of streptococci which were then grouped according to the Lancefield classification *(3)*.

Results

A total of 261 organisms were grown from 165 swabs in 91 patients (Table II). *Staphylococcus aureus* represented 21.5%, faecal organisms 37.1%, β-haemolytic streptococci 18.8%, anaerobes 11.5% and others 11.1%.

The streptococci were cultured on 48 plates. Lancefield types were: A, 14; B, 3; C, 7; and G, 24. The incidence was similar in those ulcer subgroups large enough to assess. In only 9/48 instances were β-haemolytic streptococci found in pure culture.

Table I. Bacteriological plating system for leg ulcer swabs

Aerobic	
1	General—Columbia blood agar
1	General—cysteine-lactulose electrolyte deficient
1	Selective for streptococci contains colistin sulphate 5 mg, and oxolinic acid 2.5 mg per 500 ml of medium
Anaerobic	
1	General—blood agar
2	Selective for non-sporing organisms (antibiotics)
3	Selective for bacteroides and fusiform (antibiotics)

Correspondence to: Mr I G Schraibman, Birch Hill Hospital, Rochdale, Lancs OL12 9QB

Table II. Incidence of various organisms cultured from bacteriological swabs of leg ulcers

	Total organisms (%)	*Pure culture*
Staphylococcus aureus	56 (21.5)	32
Gram-negative faecal type	97 (37.1)	39
β-haemolytic streptococcus	48 (18.4)	9
Anaerobes	30 (11.5)	8
Other	29 (11.1)	13

Total number of patients 91
Total number of swabs 165

Antibiotic sensitivity of β-haemolytic streptococcus

Routine first-line sensitivity testing included penicillin V, erythromycin, co-trimoxazole and tetracycline. Streptococci were sensitive to these agents in 95%, 98%, 89% and 77% of cases respectively.

Discussion

The incidence of β-haemolytic streptococci in this series is at variance with previous reports. The series quoted previously *(1)* found this organism in less than 1% of swabs. In another series *(4)*, 452 organisms were isolated from 284 ulcers, but streptococci were never isolated. In analysing success or failure of skin grafting for leg ulcers in 88 patients, Gilliland *et al. (5)* believe that staphylococci and pseudomonas organisms were associated with failure; despite close bacteriological monitoring, streptococci were rarely encountered.

The high incidence quoted in this series (18.8%) is a reflection of the bacteriological methods used. If no plate specific for streptococci is included, the incidence is neglible if it is found at all. It has long been the experience of plastic surgeons that haemolytic streptococci are destructive of grafted skin and this was confirmed by Jackson *et al. (6)*; reference to Table III shows the reason for this, ie the numerous lytic enzymes produced by streptococci.

The effect of haemolytic streptococci has recently been confirmed by a plastic surgery team *(7)*. They found 77 failures of skin grafts after early 'take' in over 200 grafts, associated with a positive culture of streptococci. It is of great interest that in only 55% of these failures was the notorious Lancefield group A (*Strep. pyogenes*) responsible; 45% were due to types B, C and G.

Table III. Exotoxins of streptococcus pyogenes (A)

Cytolysin	NADase	Hyaluronidase
Streptokinase	DNAase	Fibrinolysin
Erythrogenic toxins	Leucocidin	Serum opacity factor

From Topley WWC, Wilson G. *Principles of Bacteriology, Virology and Immunity*, 7th Ed, Vol. 1. London: Edward Arnold, 1984:339.

In my own experience, β-haemolytic streptococci are not necessarily initiators of ulceration but are more often secondary invaders and can recolonise after inadequate antibiotic therapy. The chosen agent should be given by mouth for between 2 and 4 weeks and repeated swabs taken after cessation of antibiotic therapy and particularly prior to skin grafting.

Conclusion

β-Haemolytic streptococci are invasive organisms destructive of skin. Their incidence is higher than previously recognised, provided selective culture methods are used. In view of the lack of bacterial resistance to first line antibiotics and the reported harmful effect of all the subgroups, any β-haemolytic streptococcus isolated should be energetically treated.

References

1 Erickson G, Eklund HE, Kallings LO. The technical significance of bacterial growth in leg ulcers. *Scand J Infect Dis* 1984;**16**:175–80.

2 Schraibman IG. The bacteriology of leg ulcers. *Phlebology* 1987;**2**:265–9.

3 Lancefield RC. Serological differentiation of human and other groups of haemolytic streptococci. *J Exp Med* 1933;**57**:571–95.

4 Gieler U, Vogt E. Development of bacterial flora in leg ulcers. *Z Hautkr* 1984;**59**:435–42.

5 Gilliland EL, Dore CJ, Nathwani N, Lewis J. Bacterial colonisation of leg ulcers and it's effect on the success rate of skin grafting. *Ann R Coll Surg Engl* 1988;**70**:105–8.

6 Jackson DM, Lowbury EJL, Topley E. Chemotherapy of streptococcus infection of burns. *Lancet* 1951;**2**:705–11.

7 Wilson GR, French GW, Sully L. Loss of split thickness skin grafts due to non-group A β-haemolytic streptococci. *Ann R Coll Surg Engl* 1988;**70**:217–19.

Received 21 September 1989